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the calcareous shales of the Skaneateles, Moscow, and Ludlowville formations of New York, this Gaspè sandstone fauna presents a predominant agreement, having sixteen identities and six affines, or approximately 50 per cent. of the fauna." The presence of this Hamilton element in the fauna is indicative, according to Dr. Clarke, of an invasion of the latter fauna from the west, while the earlier Helderberg-Oriskany fauna still occupied the sea in the Gaspè region. An alternative interpretation, the invasion of the Hamilton fauna from the south along the Atlantic border, should perhaps be considered. The Onondaga fauna is not differentiated in the Gaspè region, it being one of the undifferentiated elements in the Grand Grève fauna.

The evidence is thus fairly cumulative that the Gaspè basin was an area of rapid evolution during the early Devonian and a center of dispersion from which the lines of immigration departed westward. We cannot now say that they did not also lead thence eastward. In a later Devonian stage this basin was the recipient of migrants from the west. The course of migration into and out of the interior Appalachian waters was along a seaway which cannot yet be traced step by step, but evidently parallel to the Appalachian folds. There seems now a fair presumption of a continuous connection between the Gaspè basin and the east by way of the Connecticut trough into eastern New York. The tangible evidence of this connection will be set forth more fully hereafter. The Gaspè EoDevonian basin extended from the Canadian Archean shield at the north to the limit of the Dalhousie beds on the south and contracted in the middle Devonian. Apparently there was no free and open connection between it and the parallel contemporaneous embayments at the south in which the Chapman and Moose River sandstones of Maine were set down.

The faunas described in this Memoir are illustrated by 48 finely executed lithographed plates which are fully up to the standard so long established and maintained by the State of New York in her paleontologic publications. Not the least attractive feature of the book is the frontispiece, a reproduction in color of the painting by Frederick James of that most striking landmark of the Gaspè coast, Percé Rock.

S. W.

Textbook of Petrology. By F. H. HATCH. New York: Macmillan.

This book, which is a fifth edition, revised and rewritten, contains a summary of the modern theories of petrogenesis, a description of the rock-forming minerals, and a synopsis of the chief types of igneous rocks and their distribution as illustrated by the British Isles. The work is concise and somewhat comprehensive and may serve very well for an introduction to the study of igneous rocks, with the aid of the microscope. Part I treats

of the physical characters of igneous rocks, their mode of occurrence, structure, texture, and composition. In Part II some seventy pages are devoted to mineral descriptions, and in the back of the book are four pages of tables to be used for the determination of the common rock minerals. The usefulness of this part of the work would be greatly increased if it contained a colored plate showing the maximum birefringences of minerals for various thicknesses of plates. It is presumed that the student has a knowledge of optics. Part III is devoted to the classification of igneous rocks, the method being essentially the qualitative system now in use. Part IV devotes about one hundred pages to the distribution of igneous rocks of Great Britain. This part of the work is illustrated by many text figures and is a brief summary of the petrography of the British Isles. The work is well arranged and includes much useful data. The American student of igneous rocks could wish for a rather more comprehensive treatment of differentiation, magmatic stopping, and related subjects; with a brief résumé of the quantitative system of rock classification, the use of which is increasing on this continent.

W. H. E.

The Ephemeral Volcanic Island in the Iwôjima Group. BY T. WAKIMIZU. Publication of the Earthquake Investigation Committee in Foreign Languages, No. 22, Section C, Art. 1. With Plates I-XII. Tôkyô, 1908.

The island appeared February 1, 1905, three nautical miles east of M. Iwôjima. It was three miles in circumference, 480 feet in height and contained about 200 acres in area. The lava was of the olivine-augite-andesite type resembling closely that of Mt. Pipe in Iwôjima. From its geographic position and nature of ejecta it seemed clear that the ephemeral island was a volcano belonging to the same volcanic line as the three principal volcanic islands of the Iwôjima group. On June 16, 1905, the island had almost disappeared. The cause of submergence was attributed to the erosive action of the waves and possibly to depression of the crater rim.

C. J. H.

Formation of Geodes with Remarks on the Silicification of Fossils. BY RAY S. BASSLER. From the Proceedings of the United States National Museum, Vol. XXXV, pp. 133-54, with Plates XVIII-XXIV. Washington, 1908.

The author finds in his study of the formation of geodes in the Keokuk geode beds and in the shales and limestones of the Knobstone division of the